

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to FIGs. 1a, 7, 8, 10(a)(i) – 10(a)(iii) and 11(a)-11(b). These sheets, replace the original sheets. In FIGs. 1a-b, previously omitted elements 8 and 9 have been added. In FIGs. 7 and 8, reference numerals have been corrected for consistency with the specification. FIGs. 10(a)(i) – 10(a)(iii) and 11(a)-11(b) are now labeled as prior art.

Attachments: Replacement Sheets

REMARKS

By this Amendment, Applicants cancel claim 18 without disclaimer of the underlying subject matter or prejudice against subsequent prosecution. Applicants also amend the specification (including the Abstract) and claims 1, 2, 4, 6, 8, 10, 11, 19, 27, 30 and 32, and add new claims 34-37. Accordingly, claims 1-2, 4-17, 19 and 27-37 remain pending in the application.

Reexamination and reconsideration are respectfully requested in view of the following remarks.

OBJECTION TO ABSTRACT

By this Amendment, Applicants replace the original abstract with a new abstract – a clean copy of which is provided on a separate sheet at the end of this Amendment.

Accordingly, Applicants respectfully request that the Examiner withdraw the objection to the abstract.

OBJECTIONS TO DRAWINGS

The Office Action objects to FIGs. 1a-b, FIGs. 5-6 and FIGs. 7-8 on various grounds.

By this Amendment, Applicants amend the specification to address the objections to FIGs. 1b, 5 and 6. Applicants also amend FIGs. 1a, 7, 8, 10(a)(i)–10(a)(iii) and 11(a)–11(b) to address the objections thereto.

Accordingly, Applicants respectfully request that the Examiner withdraw the objections to the drawings.

OBJECTION TO SPECIFICATION

The Office Action objects to the specification on various grounds.

By this Amendment, Applicants amend several paragraphs in the specification to address these objections, except the objections pertaining to the section headings

and the “brief summary of the invention.”

Regarding the objection to the section headings, Applicants thanks the Examiner for providing information about recommended section headings. However, Applicants respectfully decline to add the headings. Section headings are not statutorily required for filing a non-provisional patent application under 35 USC § 111(a), but per 37 CFR § 1.51(d) are only guidelines that are suggested for applicant's use. (See Miscellaneous Changes in Patent Practice, Response to comments 17 and 18 (Official Gazette, August 13, 1996) [Docket No: 950620162-6014-02] RIN 0651-AA75 (“*Section 1.77 is permissive rather than mandatory. ... [T]he Office will not require any application to comply with the format set forth in 1.77*”)).

Regarding the objection to the “brief summary of the invention,” Applicants respectfully submit that the application does not include any “brief summary of the invention” nor – as explained above – is it required to do so. So Applicants respectfully traverse these objections.

Accordingly, Applicants respectfully request that the Examiner withdraw the objections to the specification.

OBJECTION TO CLAIMS

The Examiner objects to claims 2, 6, 8, 10 and 11 on various grounds.

By this Amendment, Applicants amends claims 2, 6, 8, 10 and 11 to address these objections.

Accordingly, Applicants respectfully request that the Examiner withdraw the objections to the claims.

35 U.S.C. § 112

The Office Action rejects claims 1, 2, 4-19 and 27-33 under 35 U.S.C. § 112 for various reasons.

By this Amendment, Applicants amend claims 1, 4, 19, 27, 30 and 32 to address all of these issues, except for the rejection of claim 2.

Applicants respectfully traverse the rejection of claim 2. It is well-established that claims using the “comprising” preamble are open-ended and do not preclude additional elements and features. In particular, an aberration means that is defined by a filter function, may further be defined by another filter function – or several other filter functions. Applicants respectfully submit that there is no conflict between claims 1 and 2.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejections of claims 1, 4, 19, 27, 30 and 32 under 35 U.S.C. § 112.

35 U.S.C. §§ 102 & 103

The Office Action rejects claims 1, 2, 4-14, 16, 17, 19 and 27-33 under 35 U.S.C. § 102 over Neil et al. WO 00/17612 (“Neil”) and claims 15 and 18 under 35 U.S.C. § 103 over Neil in view of Greenaway et al. WO 99/46768 (“Greenaway”).

Applicants respectfully submit that all of the claims are patentable over the cited art for at least the following reasons.

Claim 1

Among other things, in the apparatus of claim 1 the aberration means is configured to act on an input radiation wavefront to produce first and second output radiation signals that are distorted images of the input radiation wavefront.

Applicants respectfully submit that Neil does not produce first and second output radiation signals that are **distorted images of the input radiation wavefront**. Instead, Neil teaches the use of pairs of spatially separated **light points** or spots, for example employing a detector consisting of a pinhole mask (see, e.g., page 2, lines 19-31, page 3, lines 12-15, page 5, lines 26-29, page 21, lines 10-17, etc.). Neil does not appear to specify which point is employed but it would appear to come from the center or close to the center of the points defined by tilts added to the mask functions. Even when larger points or spots are discussed, Neil outlines the integration of the signal to produce a single number.

In contrast, the apparatus specified in claim 1 uses two whole distorted images

of the wavefront. The use of the whole of each image (and not just a selected point as Neil employs) offers a significant advantage in terms of photometric efficiency.

In summary, Neil does not disclose or suggest producing first and second output radiation signals that are distorted **images** of the input radiation wavefront.

Therefore, Neil does not disclose the apparatus of claim 1.

Also among other things, the apparatus of claim 1 includes aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry.

The Office Action states that Neil discloses this in FIGs. 4 and 10 and at page 9, lines 16-26.

FIGs. 4 and 10 most certainly do not show that an aberration means the shape of which is defined by **a filter function that is complex valued and has non-mixed symmetry**. Indeed, FIGs. 4 and 10 do not disclose any particular filter function.

Meanwhile, Applicants respectfully submit that the text at col. 9, lines 16-26 does not disclose or mention that any filter function of an aberration means is **complex valued and has non-mixed symmetry**.

Therefore, again, Neil does not disclose the apparatus of claim 1.

Accordingly, for at least these reasons, Applicants respectfully submit that claim 1 is patentable over Neil.

Claims 2, 4-14, 16-17 and 30-31

Claims 2, 4-14, 16-17 and 30-31 all depend from claim 1 and are patentable for at least the reasons set forth above with respect to claim 1, and for the following additional reasons.

Regarding claim 2, Applicants respectfully submit that the cited text at page 11, lines 9-19 does not make any mention of the filter functions being a complex conjugate pair.

Regarding claim 31, Applicants respectfully submit that the cited text at page 9, lines 19-29 does not disclose that the filter function is non-quadratic.

Claim 19

Among other things, in the method of claim 19 the aberration means acts on the input radiation wavefront to produce first and second output radiation signals that are distorted images of the input radiation wavefront.

As explained above with respect to claim 1, Applicants respectfully submit that Neil does not disclose this combination of features.

Also among other things, the method of claim 19 includes transmitting an input radiation wavefront through an aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry.

As explained above with respect to claim 1, Applicants respectfully submit that Neil does not disclose this combination of features.

Accordingly, for at least these reasons, Applicants respectfully submit that claim 19 is patentable over Neil.

Claim 27

Among other things, in the apparatus of claim 27 the aberration means acts on the input radiation wavefront to produce first and second output radiation signals that are distorted images of the input radiation wavefront.

As explained above with respect to claim 1, Applicants respectfully submit that Neil does not disclose this combination of features.

Also among other things, the apparatus of claim 27 includes an aberration means, the shape of which is defined by a filter function that is complex valued and has non-mixed symmetry.

As explained above with respect to claim 1, Applicants respectfully submit that Neil does not disclose this combination of features.

Accordingly, for at least these reasons, Applicants respectfully submit that claim 27 is patentable over Neil.

Claims 28-29

Claims 28-29 depend from claim 27 and are deemed patentable for at least the

reasons set forth above with respect to claim 27, and for the following additional reasons. With respect to claim 29, Applicants respectfully submit that the cited text does not disclose that when the wavefront shape is planar, the output signal is substantially zero.

Claim 32

Among other things, in the apparatus of claim 1 the aberration means is configured to act on an input radiation wavefront to produce first and second output radiation signals that are distorted images of the input radiation wavefront.

As explained above with respect to claim 1, Applicants respectfully submit that Neil does not produce first and second output radiation signals that are **distorted images of the input radiation wavefront**.

Therefore, Neil does not disclose the apparatus of claim 32.

Also among other things, the apparatus of claim 32 includes aberration means the shape of which is defined by a filter function, the filter function having a real part and an imaginary part, the real and imaginary parts both having even symmetry or both having odd symmetry.

The Office Action states that Neil discloses this in FIGs. 4 and 10 and at page 9, lines 16-26.

FIGs. 4 and 10 most certainly do not show that an aberration means the shape of which is defined by **a filter function having a real part and an imaginary part, the real and imaginary parts both having even symmetry or both having odd symmetry**. Indeed, FIGs. 4 and 10 do not disclose any particular filter function.

Meanwhile, Applicants respectfully submit that the text at col. 9, lines 16-26 does not disclose or mention that any filter function of an aberration means **has a real part and an imaginary part, the real and imaginary parts both having even symmetry or both having odd symmetry**.

Therefore, again, Neil does not disclose the apparatus of claim 32.

Accordingly, for at least these reasons, Applicants respectfully submit that claim 1 is patentable over Neil.

Claim 33

Claim 33 depends from claim 32 and is deemed patentable for at least the reasons set forth above with respect to claim 32.

Also, as explained above with respect to claim 1, Applicants respectfully submit that Neil does not disclose filter function that is complex valued and has non-mixed symmetry.

Claims 15 and 18

Claims 15 and 18 depend from claim 1. Greenaway does not remedy the shortcomings of Neil as set forth above with respect to claim 1, and therefore claims 15 and 18 are deemed patentable for at least the reasons set forth above with respect to claim 1.

NEW CLAIMS 34-37

New claims 34-37 depend variously from claims 1, 19 and 32 and are deemed patentable for at least the reasons set forth above with respect to claims 1, 19 and 32, and for the various other novel features recited therein (e.g., wherein the output signal indicates an extent to which the wavefront shape is non-planar and when the wavefront shape is planar, the output signal is substantially zero; and wherein the filter function is non-quadratic).

CONCLUSION

In view of the foregoing explanations, Applicants respectfully request that the Examiner reconsider and reexamine the present application, allow claims 1-2, 4-17, 19 and 27-37, and pass the application to issue. In the event that there are any outstanding matters remaining in the present application, the Examiner is invited to contact Kenneth D. Springer (Reg. No. 39,843) at (571) 283-0720 to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No.

50-0238 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17, particularly extension of time fees.

Respectfully submitted,
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